RIGHT ATRIAL VOLUMES AND PHASIC FUNCTION BY 3D ECHOCARDIOGRAPHY IN HEALTHY SUBJECTS

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Authors: Luigi P. Badano, Diletta Peluso, Denisa Muraru, Lucia Dal Bianco, Attila Kovacs, Sabino Iliceto, University of Padua, Padua, Italy

Background: Right atrial (RA) size is a well-known predictor of outcome in pulmonary artery hypertension and heart failure. At present it is mainly measured by 2D echo (2DE) as area or volume. Recently 3D echo (3DE) showed to be more accurate than 2D in measuring heart chamber volumes. Accordingly, our aim was to assess reference values of RA geometry and function using 3DE.

Methods: 169 healthy subjects (44±15 years; 42% men) underwent 2DE and 3DE. A 3D full-volume acquisition dedicated for RA was performed and then quantitated with a dedicated software. We measured maximal (Vmax), minimal (Vmin) and preA (VpreA) volumes and total (TotSV), passive (PassSV) and active (ActSV) stroke volumes and ejection fractions (TotEF, PassEF, ActEF).

Results: 3DE volumes were larger than those obtained with 2DE (Vmax 53±16 vs 42±14, Vmin 20±8 vs 18±7, VpreA 29±10 vs 28±11; for all p<0.0001). 3D volumes were significantly larger in men than in women: Vmax was 32±8 vs 27±6 ml/m2; Vmin was 13±4 vs 10±3 ml/m2; VpreA was 18±5 vs 15±4 ml/m2, respectively (for all p<0.0001). SVs showed the same trend: TotSV was 37±12 vs 30±8 ml and PassSV was 27±11 vs 21±7 ml (p<0.0001 for both); ActSV was 10±4 vs 8±4 ml (p=0.008), for men and women respectively. Moreover, Tot and ActEFs appeared to be greater in women: 60±9% vs 64±9% and 29±7% vs 33±9% respectively (p=0.002), while passive EF was unchanged (32±7% vs 32±9, p=NS). RA volumes did not change with age. PassSV and EF appeared to decrease with age (r=-0.29 and r=-0.41, p<0.0001) while ActSV and EF appeared to increase (r=0.22, p=0.004 and r=0.18, p=0.018), with a TotSV and EF decreasing with age (r=-0.19, p=0.013 and r=-0.21, p=0.006).

Conclusions: In healthy subjects, 3D-RA size and function varied significantly with gender and these differences were not eliminated by indexing them by body surface area. Despite no age-related changes in RA volumes were found, ageing was associated with a progressive decrease in passive function and increase in active function.